



Exosomes and Microvesicles: from Stem Cell Biology to Translation in Human Diseases

Giovanni Camussi¹

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Extracellular membrane vesicles actively secreted by cells represent a well evolutionary preserved mechanism of cell-to-cell communication [1]. This mechanism is still present in all life kingdoms from protists to mammals. Secreted vesicles are a heterogenous population with a complex structure that reproduces in a nanoscale cell complexity. These vesicles are constituted by a lipid bilayer membrane that express markers and receptors of the cell of origin and contain cell constituents such as bioactive lipids, proteins and nucleic acids. This field of research is affected by an imperfect nomenclature due to the difficulty of classification of cell released vesicles. The term microvesicles has been extensively used to indicate vesicles released by budding of plasma-membrane and includes different categories of vesicles such as larger pre-apoptotic vesicles with a size close to 1000 nm and smaller vesicles released by perfectly healthy cells in a nano-range. The latter were also indicated as extracellular microvesicles or ectosomes to distinguish them from exosomes which are secreted by exocytosis from the multivesicular bodies. To discriminate these types of vesicles may be difficult as they share similar molecular targets and mechanisms of cell sorting. Therefore, an accurate description of methods of isolation and characterization is important for definition of different populations. Independently from their classification, extracellular membrane vesicles share a common mechanism of action, the transfer from the cell of origin of transcripts that may target pathways in the recipient cell inducing epigenetic, functional and phenotypic changes in the latter. This Special Issue of Stem Cell Reviews and Reports has selected papers that, independently from the nomenclature used, deal with

extracellular membrane vesicles secreted by stem cells. Ratajczak et al. [2] first demonstrated that stem cell released membrane vesicles play an important role in stem cell biology. Since then, a number of studies have shown the transfer of genetic information among cells [2–6]. Stem/progenitor cell-derived extracellular vesicles have a paracrine and autocrine action on stemness maintenance or cell differentiation and may act as paracrine mediators of stem cell regenerative properties [7]. Great advances were achieved in definition of molecular cargo and on biogenesis of different classes of extracellular membrane vesicles as well as in their function. Moreover, their potential use as therapeutic substitute of stem cells for their pro-regenerative properties has been extensively explored. In this special issue original reports and reviews related to the molecular and functional properties of stem cell-derived membrane vesicles, and to their regenerative potential and involvement in human diseases are published.

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✉ Giovanni Camussi
giovanni.camussi@unito.it

¹ Department of Medical Sciences, University of Turin, Turin, Italy

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